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TRANSLATION

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 0000055361	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/EP2005/001533	International filing date *(day/month/year)* 16.02.2005	Priority date *(day/month/year)* 20.02.2004

International Patent Classification (IPC) or national classification and IPC

C07C67/08 C07C67/62 C07C69/54 C08G65/332 C08G65/26 A61L15/60

Applicant

BASF Aktiengesellschaft

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of _____ sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 4 sheets, as follows:

      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))

      _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP Facsimile No.	Authorized officer Telephone No.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2005/001533

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

☐ international search (Rule 12.3 and 23.1(b))

☐ publication of the international application (Rule 12.4)

☐ international preliminary examination (Rule 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☐ the international application as originally filed/furnished

☒ the description:

pages 1-44 as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☒ the claims:

nos. _____ as originally filed/furnished

nos.* _____ as amended (together with any statement) under Article 19

nos.* 1-15 received by this Authority on 22.06.2006 with telefax

nos.* _____ received by this Authority on _____

☐ the drawings:

sheets _____ as originally filed/furnished

sheets* _____ received by this Authority on _____

sheets* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____

☐ the claims, nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2005/001533

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-15	YES
	Claims		NO
Inventive step (IS)	Claims	1-15	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-15	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

1. Amendments

The restriction of claims 1 and 2 to αβ-ethylenically unsaturated carboxylic acids B is supported by the original description at page 14 line 27. The introduction and amendment of the appendancies of claims 10-12 likewise do not go beyond the disclosure content at the filing date.

The amendments submitted by letter dated 22.06.2006 are therefore in unison with PCT Article 34(2)(b).

2. Reference is made to the following documents:

D1: EP-A-0 376 090 (HENKEL) 4 July 1990

D2: DE 102 25 943 A1 (BASF AG) 8 January 2004

D3: DATABASE CA [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; "Coumarone derivative-based stabilizers for organic compounds" found in XP002331759 STN Database accession no. 1985:524489

D4: DE 101 31 479 A1 (Röhm GmbH) 6 February 2003

D5: DE 199 61 464 A1 (Clariant International) 21 June 2001

D6: EP-A-0 340 718 (Merck Patent GmbH) 8 November 1989

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

3. Novelty

3.1 Document D1 describes (see the examples and claims) a process for producing (meth)acrylic esters of polyhydric alcohols wherein tocopherols are used as polymerization inhibitors.

Document D2 (see claims 1 and 18) shows the esterification of polyols with ethylenically unsaturated carboxylic acids and also the production of hydrogels in the presence of a polymerization inhibitor D. The polymerization inhibitor D can be selected from a list (see paragraph [0089]) which includes tocopherols.

Document D4 concerns the use of tocopherols for colour stabilization of foundation-stabilized ethylenically unsaturated monomers, in particular hydroxyalkyl (meth)acrylates.

The processes according to claims 1 and 2 and also the use according to claims 12 to 14 differ from these known processes in using chromanol derivatives of the formula (III) wherein the R13 and R14 radicals are hydrogen or C1-C4-alkyl, whereas the known tocopherols have a phytyl radical in this position.

3.2 Crosslinked hydrogels according to claims 8 to 10, obtainable by the process according to any one of the claims 2 to 6, or by crosslinking with a reaction mixture comprising ester F and obtainable from a process of claims 1 to 6, or comprising a 6-chromanol derivative of the formula (III) of claim 1 are likewise not known as such from the prior art (D1, D2, D4). The same holds for their use according to claim 11.

3.3 Document D3 describes 2,2,5,7,8-pentamethyl-6-chromanol as useful as a stabilizer for storage of acrylic acid.

Document D5 describes mixtures of phosphines and chroman derivatives, including those conforming to formula (III) of claim 1, for stabilizing of polymers, particularly polyolefins, against thermal-oxidative degradation.

Hydrogels comprising a 6-chromanol derivative of the formula (III) of claim 1 are not described in D5.

Compositions of matter comprising 6-chromanol derivatives of the formula (III) of claim 1 and at least one stabilizer selected from the group comprising phenothiazine, hydroquinone, hydroquinone monomethyl ether and hypophosphorous acid according to claim 15 are not described in D3 and D5.

Document D6 concerns chroman derivatives having a pharmacological effect on the cardiovascular system. Compositions of matter corresponding to claim 15 are not described.

3.4 The subject matter of claims 1 to 15 is therefore not known from the prior art D1 to D6 and is novel (PCT Article 33(2)).

4. Inventive step

4.1 Documents D1 and D2, which concern the production of respectively hydroxyacrylates and hydrogels using structurally similar polymerization inhibitors (tocopherols), can be considered as closest prior art to claims 1 and 2.

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Inventive examples 1 and 2 of the application demonstrate by comparison with comparative example 2 that the 6-chromanol derivatives of the formula (III) of claim 1 are superior to the known tocopherol in preventing unwanted polymerization when used in smaller amounts. The colour number of the products is only slightly higher.

The problem to be solved can therefore be considered that of suppressing polymerization during the production of esters of ethylenically unsaturated carboxylic acids without obtaining excessively discoloured products.

The solution to this problem which is proposed in claims 1, 2 and 13 of the present application involves an inventive step (PCT Article 33(3)) for the following reasons:

chromanols, such as 2,2,5,7,8-pentamethyl-6-chromanol for example, are described in document D3 as non-toxic stabilizers for acrylic acid, although D3 is more concerned with storage stabilization. Document D5 relates to the use of 6-chromanol derivatives for stabilizing polymers, particularly polyolefins, against thermal-oxidative degradation. There is nothing in D3 and D5 to suggest using 6-chromanol derivatives as process stabilizers in the production of (meth)acrylic esters.

Nor was it foreseeable for a person skilled in the art that 6-chromanol derivatives of the formula (III) of claim 1 would be better in suppressing the formation of polymer deposits than the known tocopherol.

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Dependent claims 3 to 7 likewise meet the PCT requirements for inventive step.

4.2 Crosslinked hydrogels according to claims 8 to 10 do not appear to be obvious even as such from the prior art, in particular from D5, which concerns stabilized polymers, and therefore can be regarded as inventive (PCT Article 33(3)).

The use of the hydrogels according to claim 11 therefore likewise meets the PCT requirements for inventive step.

4.3 Stabilizer mixtures according to claim 15 can be regarded as inventive (PCT Article 33(2)) over the prior art (D1 to D5) because of the improved efficacy in the production of polyol (meth)acrylates.